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Optoelectronic Microwave Oscillator JAY SHARPING, JEFF MILLER, NABIN RAUT, University of California at Merced — The optoelectronic microwave oscillator (OEO) is a device that takes light from a continuous wave pump laser as an input and converts it into a high repetition rate optical pulse stream and an ultra-stable microwave signal. We report on our initial results with an OEO operating at 10 GHz incorporating a coaxial stub cavity. Light from a 1550 nm laser is sent through a variable fiber delay (between 10 m and 10 km) before being detected. The electrical signal is then amplified and spectrally filtered before being fed back into an electro-absorption modulator to modulate the laser. This generates a series of side bands on the optical beam around the center wavelength, spaced at 10 GHz intervals. The OEO can be used to generate microwave signals, or be used as the basis for an optical clock recovery setup. Instead of the traditional electronic band pass filter, this setup uses a fabricated aluminum stub cavity as a band pass filter. We envision incorporating the OEO in a 10-GHz superconducting radio frequency system for use in microwave optomechanics experiments. Using different materials and stub geometries, we can alter the quality factor of the cavity and study the influence it has on optoelectronic devices such as the OEO.

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